OPTICAL REHABILITATION

AND THE EDUCATION OF LOW VISION CHILDREN AND YOUTH

A SUMMER INSTITUTE REPORT

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PREFACE

The last decade has marked a period of rapid expansion in programs for visually impaired children. Inherent in this growth is a vitality that has led to fresh thinking and to new approaches to educating and guiding the children with varying degrees of visual loss. To evaluate this growth, to determine where we are in terms of where we have been, and to chart a course of where we should be going, a three-week summer institute entitled Optical Rehabilitation and the Education of Low Vision Children and Youth was held at San Francisco State College from July 17 to August 4, 1967.

This three-week project was financed through a grant from the U. S. Office of Education under Public Law #85-926. A selected group of twenty participants with background and experience in the area of the visually impaired was provided for in the original plan. Eight additional students with comparable backgrounds and experience were invited to join the group. Fortunately the grant provided a preplanning period for the institute with appropriate clerical assistance.

As a result of the preplanning and early exploration on the part of the participants the report is presented in three parts. Participants were divided into three major committees from which representatives were drawn to form a steering committee and an editorial committee. The three major committees each concerned themselves with one of the following topics.

1. Medical, psychological, and educational evaluation
2. Educational planning and services
3. Existing and needed research

The work of the institute was facilitated by a crowded schedule of meetings for these committees.

The content of the report developed from the following sources.

a. The contributions of the lecturers in their formal presentations and in their meetings with the separate committees

b. Demonstrations and interviews with low vision children who were interested in contributing through media of video and audio recordings and live interviews

c. The library assembled previous to the institute

d. Added references supplied by the lecturers and participants

e. Continuing discussion among the members of the groups responsible for the three areas above

For the names of the lecturers and participants see appendixes A and B.

One of the major concerns of the institute was the definition of the two terms in the title of the project, optical rehabilitation and low vision children. Drawing on the discussion of Dr. Richard E. Hoover and with the support of other lecturers, the following definitions were suggested as describing both the service and the type of children under consideration in this report.

1. Optical Rehabilitation means the provision of appropriate optical aids and services necessary for the person to achieve his visual ability, understand his visual problems, and accept the conditions required for his maximum visual functioning. The definition also implies, in some cases, the need for qualified professional service leading to appropriate lenses and/or low vision aids with accompanying recommendations and instruction in their use.

2. Low vision children are those children who because of visual disabilities, cannot handle easily and at the same rate the same educational materials and tasks that normally seeing children manage with facility.

These definitions suggest that we need to look beyond central acuity and field restrictions for screening and descriptive purposes. Indexes of only visual acuity and visual fields as stated in most definitions do not necessarily describe visual ability. This view of optical rehabilitation and the low vision child implies that information concerning visual performance is of greater value to the teacher who is interested in the educational functioning of the child.

The term "low vision" is used in this report to describe those children in the larger traditional group of "partially seeing" who function with a severe visual disability. Frequently they are found within the "accepted" or "legal" definition of blindness discussed in part one.

Increasing numbers of low vision children are currently enrolled in school, and many are permitted to use their sight under appropriate conditions based on the recommendations and guidance of both eye specialists and educators. However, the continuing complexity of their educational needs remains a challenge. Hopefully this report will be a useful response to that challenge.

San Francisco State College wishes to express its appreciation on behalf of the participants and the college for the grant which covered the expense of the institute and provided stipends for twenty participants. The students and the coordinators wish to extend their special appreciation to the lecturers who contributed so generously to the program. As in most reports of this type extra thanks should be given to the three graduate students who were responsible for some of the proof reading and typing of the final manuscript: Mary Cornelius, Gail Kelley, and Janet Mitchell.

All of the students and the faculty members are pleased to share these deliberations with those having a keen interest in optical rehabilitation and education of low vision children and youth. It is recognized that this report represents only the accomplishments which were possible in the limited amount of time available to those undertaking the study of a rather large and important subject. It is hoped that this somewhat tentative report will encourage others to engage in much more definitive research and also pursue increased activity on behalf of these children.

Coordinators of the Institute:

Georgie Lee Abel, Professor of Education,
San Francisco State College

Tom Kellis, Resource Teacher for the
Visually Impaired, Berkeley Unified
School District

MEDICAL, PSYCHOLOGICAL AND EDUCATIONAL EVALUATION OF LOW VISION CHILDREN

To provide a well-developed program for visually impaired children, the medical, psychological, and educational evaluation of these children must be as complete as possible. Speakers, readings, and experiences have emphasized the inadequacies of our present means of evaluation. Our attention needs to be directed toward the lack of information given in the eye report, the limited and confusing definitions of blindness including many low vision persons, incomplete preschool vision screening and reporting, and the insufficient knowledge concerning low vision aids and their use. Because of these inadequacies low vision children may not have full opportunity to achieve their maximum visual potential.

Definition of Blindness and Low Vision

The determination of which children are in need of an education adapted for their impairment is important. It involves not only descriptive and conclusive medical evaluation, but also equally definitive psychological and educational appraisal. The medical evaluation is, however, a primary problem, needing attention especially because of the confusion regarding the definitions of blindness that include many low vision persons.

There is a need for a more descriptive definition of blindness than that reflected by the visual acuity as measured by any of the current screening devices. The definitions currently used by governmental agencies and departments of education reflect the work of the social agency representatives and medical experts on the definition of blindness set forth by the American Medical Association at its 85th Annual Session, June 1934. A definition was originally necessary in order to provide economic and rehabilitation services for blind adults. Later, special education departments used the same definition in their reimbursement programs for educational purposes offered in the specialized programs in the schools. The American Medical Association definition stated that

> a person shall be considered blind whose central visual acuity does not exceed 20/200 in the better eye with correcting lenses or whose central visual acuity, if better than 20/200, has a limit to the central field of vision to such a degree that its widest diameter subtends an angle of no greater than 20 degrees.[1]

It is apparent that this definition is limited to visual acuity and limitations in field of vision. The participants at the institute are in agreement with the visiting lecturers from medicine, psychiatry, psychology, and education that much more is needed in the way of descriptive information concerning the visual ability and total rehabilitation of the low vision child. It is recognized that visual acuity alone does not necessarily indicate visual ability. Lowenfeld, Abel and Hoover have previously expressed in their writings the same point of view in spite of the fact that the definition has not changed.

Hoover described the above definition as "inadequate, unrealistic, inequitable, prejudicial and restrictive".[2] His criticisms further state that the definition

1. considers only two of several visual characteristics, distance visual acuity and central fields,

2. fails to require standardization in the measurements and recording of these two visual characteristics,

3. fails to distinguish between visual needs for vocational and avocational pursuits, and
4. fails to consider specifics for levels of disability, which implies that all within it have the same visual impairments.

Attempts were made by the Committee on Statistics on Blindness to describe vision using a "layman's criteria" for the benefit of non-medical professional people in the following manner:

1. people who are totally blind or have light perception, up to but not including 2/200 would be unable to perceive motion or hand movements at a distance of three feet;
2. the blind individual having motion or form perception might perceive up to 5/200 and would be unable to count fingers at a distance of three feet;
3. those people who might be expected to have travel vision would perceive up to 10/200 and would be unable to read large letters similar to those in the headlines of a newspaper;
4. those who would be expected to read large headlines might be measured on the Snellen Chart up to 20/200; they would not, however, be expected to read 14-point or smaller type;
5. individuals having borderline vision might have a visual acuity of 20/200 or more but they would not have sufficient vision for activities in which eyesight is essential; these individuals are further described as unable to read 10-point type, or if they read it at all, they would do so with a marked handicap.[3]

Dr. Hoover suggested a brief but very specific and more fully descriptive definition of blindness as "no useful light perception. Such a definition could be understood by either lay or medical personnel. He also suggested a new term, "cecutient," which he considered to be desirable when referring to the low vision person. "Cecutients" are those who are visually impaired. Many might not be able to handle educational processes with ease.

With this new term and its definition Hoover also suggested what he considered a more consistent and functional measurement of visual acuity. He defined visual acuity as

> the measurement of the resolving power of the retina in angular terms of minutes. The common expression 20/20 represents the ability of the retina to resolve a visual angle of one minute of arc; 20/200 represents the ability of the retina to resolve a visual angle of 10 minutes of arc. It is fortunate that we have this very logical and precise way of measuring retinal function, for this makes it possible to measure visual acuity at any distance from infinity to the anterior surface of the eyeball. It is helpful if measured at certain standard distances, one near and one far, and sometimes more, if it is to represent its constant and effective power in any visual efficiency equation.[4]

Examples of equivalent measures of central visual acuity are quoted in the table below. Excerpted from the Vocational Rehabilitation Administration, Rehabilitation Codes, Code for Impairment of Visual Function.[5] These measures illustrate the relationship between angular terms of minutes and the ratios more commonly used to measure acuity.

Equivalent Measurements of Central Visual Acuity

arc/min	20 ft./6m.	variable distances	16m./40cm.	14m./33cm.
1.0	20/20	------	40/40	14/14
4.0	20/80	------	40/160	14/56
10.0	20/200	20/200	40/400	14/140
40.0	20/800	5/200	40/1600	14/560
100.0	20/2000	2/200	40/4000	14/1400

The real concern of educators is the visual efficiency equation, which states the child's useful residual vision for educational purposes. The eye specialist then should transmit this information to the schools by the use of an eye report form.

Vision Screening

Recognizing the importance of vision screening in the very early years, national organizations and government agencies interested in eye health are promoting programs for the early detection of visual anomalies. Amblyopia ex anopsia is a major example of a defect which needs the earliest possible detection. Treatment is rarely successful after a child enters school.

Some physicians have found external eye examinations to be useful while the infant is still in the hospital nursery. First medical eye examinations have been very successful at an age as early as eight to ten months. It is not always understood that eye specialists can usually test an eight to ten-month-old infant for duction, vergence, anomalies in the media, and, especially, refractive errors. It is suggested by many eye specialists that first tests for visual acuity should be given when the child is approximately three years of age.

The school nurse assumes a major role in all vision screening programs in school. She also has much to offer to the community in organizing and carrying out pre-school vision screening programs. Most public schools have routine vision screening programs for all school children.

Through departments of health or departments of education, vision screening could be coordinated on a state-wide basis. A small number of states have legislated a mandatory reporting of visually impaired persons in order to provide total health and rehabilitation services. There is a need for further and periodic evaluations of the vision screening activities; tests now used, interpretation given to this screening, utilization of additional or different techniques to locate children now being missed, and the thoroughness of the follow-up program.

Any effort to mobilize communities and schools in mass vision screening is only as effective as the involvement of all capable and concerned professional and lay people. Certain studies of mass vision screening have resulted in needed improvements but there is still room for further research.

The Eye Report Form and the Low Vision Child

School personnel need to make maximum use of the eye report. Too often the report is used only as a ticket of reimbursement for the school district and may only carry the minimum information needed to apply for reimbursement. Hopefully educational agencies will require more complete and useful information on eye report forms.

Based primarily on the National Society for the Prevention of Blindness Eye Report for Children with Visual Problems[6] and information in the Rehabilitation Codes,[7] the following list suggests some of the measurements, terms, and related information that are necessary to understand the eye condition of low vision children. This list is more suggestive than comprehensive. It reflects the continuing hope that the data available regarding low vision children will more directly inform us about their visual functioning and their potential educational performance.

1. Identification data should include name, sex, race, address, birth-date, present school enrollment, and grade placement.

2. History should list probable age at onset of impairment; any severe infections, injuries, or operations, and dates; relatives with hereditary visual impairment; and any other unusual factors such as prematurity or tendency to myopia.

3. Visual acuity should be recorded for both distant and near; before and after correction; and in the right eye, left eye, and both eyes.

4. Refractive error is apparent in the prescribed refraction. The eye report should list sphere, cylinder, and axis prescribed for both right and left eyes.

5. Fields of vision should be indicated on a chart or in numerical notations that show specific limitations and losses.

6. Color perception defects can be noted as the absence or limited discrimination of green, red, blue and/or blue-yellow.

7. Etiology should clearly note what conditions were responsible for the impairments.

8. Prognosis and recommendations should indicate if the condition is stable, deteriorating, improving or uncertain; whether any treatment is recommended; and what time is recommended for re-examination. If glasses or low vision aids are recommended, the report should list at what times they should be used. Any limits on the use of eyes or on general physical activity should be explicitly noted.

Understanding the eye physician's notations requires close attention to the meaning of his measurements. The following explanations of methods of recording prescribed refraction and field limitations illustrate the complexity and volume of information available in the eye physician's notations.

The prescription for refractive error notes the power needed to bring rays into focus. The measure is given in diopters. The number of diopter correction is the reciprocal of the meter distance at which an object is brought into focus.

A plus (+) correction or convex lens is used to correct a hyperopic condition. A minus (-) correction or concave lens is used for myopes. Measures are made in both meridians, vertical and horizontal. If the correction is the same for both, only one diopter measure will be given. But often, as in the case of an astigmatism, where the radius of curvature of one meridian of the cornea is greater than the other, the correction for one meridian is not adequate for the other. In this case, two dioptic numbers will be given. The first is the spherical lens correction; the second is for the cylindric lens. The equivalent power of the cylindric lens is equal to half that of the sphere.

There is more than one way to express the same finding, but each tells the diopter correction, (+) or (-), and degree of axis. For example, a correction for a hyperopic eye might read +8.00 +5.00 X 105. This says: (+) correction of 8 diopters sphere, (+) correction of 5 additional diopters in a cylinder at an axis of 105 degrees. Remembering that the second (cylindric) correction is equal in refractive power to ½ the spherical correction, the entire prescription yields an equivalent dioptic power of 10.50, i.e. [+8+(½ of +5)]. This same prescription could have been written thus: +13.00 -5.00 X 15, calling for a correction of +13 sphere, -5 cylinder, and an axis of 15 degrees. This merely corrects the other meridian first. The axis given, 15 degrees, is the point of reference for the second measure. It too yields a dioptic power of +10.50, i.e. [+15.00+(½ of -5)]. Two ways to note a myopic correction would be: a) -10.00 +5.00 X 180 (-10D sphere, +5D cylinder at 180), b) -5.00 -5.00 X 90 (-5D sphere, -5D more cylinder at 90). Both prescriptions have an equivalent correction power of -7.50D.

A field test measures the ability of each eye to perceive form and color at a constant distance from the eye, at points up, down, and to the sides. Measures should be made of both central and peripheral fields and should be plotted on a chart designed for this purpose. In addition a numeric notation should be included. It should indicate the 1) diameter in millimeters of the disc used, 2) distance the disc was maintained from the eye in millimeters, and 3) the color of the disc used. A standard measure for peripheral field appears as: 3/330/W (white). A full field at 3/330/W indicates no scatoma is present. Central field measures can be made at greater distances with a smaller disc. A typical notation would be 1/1000/W. (See 1, 2, 3 above.)

Low Vision Aids

It has been suggested that there are various factors involved in total optical rehabilitation. For example, patients who are fortunate in securing a competent and time consuming examination may have a refraction that indicates correcting lenses. Certain of them may be considered as good candidates for low vision aids which may be used in addition to their lenses or as the only aids which they use on certain occasions. When such a recommendation is made, it is hoped that the low vision person will have access to the type of center where there are competent specialists. They then can evaluate the appropriate instrument, its use, and make any necessary changes.

The work accomplished in a low vision optical aids center will have greater value to the low vision school age person if there is a close and continuing working relationship with the appropriate person in education and, in many cases, representatives in the family. This type of continuing relationship will insure the necessary evaluation of the aids and their use in varied environmental settings.

Low vision aids are varied and are used in different ways. One person may move closer to an object. Another will use a more appropriate size and style of print. Yet another person will experiment with a number of different types of optical aids and will purchase those which meet his particular needs. Evaluating his potential success with the aid should be a consideration when planning orientation and following training in the use of his aid.

Not all people profit from the use of low vision aids. The number of years between the partial loss of vision and the attempt to use these aids often determines the success or failure in their use. Dr. Robert Mandell in his lecture to the institute suggested that people with low vision may be placed in four groups as to number of years after loss of vision. Likely reactions from aids users and their families were suggested by him and the participants in the institute and appear in the appropriate sections below.

Group I. Less than 5 years
- A. Unadapted
    1. He refuses to accept verdict that sight is permanently damaged.
    2. He wants vision restored.
    3. He refuses low vision aids.
- B. Adapted
    1. He is willing to accept vision loss.
    2. He wants to use vision in the best way he can.
    3. He is willing to put up with the disadvantages of an aid.

Group II. 5 to 15 years
- A. He has accepted loss of vision and may or may not want to do something to improve it.
- B. He may like the extra attention he receives as a partially sighted person and may avoid using low vision aids.
- C. Low vision children who have been taught to read braille when capable of reading print present a complex problem in motivation.

Group III. More than 15 years
- A. He has probably adapted to his situation, and the chances of using low vision aids are poor.

Group IV. From birth
- A. He is usually willing to accept low vision aids.
- B. He may refuse help because he doesn't want to be different from other children.
- C. Sometimes parents refuse to let their child use low vision aids.

Students who desire more information concerning descriptions of low vision aids and the varieties of impairments that they benefit will examine the work of Fonda,[8] Sloan,[9] and others.

When working with children it is most important that one make a good evaluation of the aid and the conditions of its use. Just as it is important to have all helpful information about eye conditions on eye report forms, teachers should have vital information based on the eye specialist's work with the child as the child uses prescribed aids. Such report forms provided by educators and/or the eye specialists can contribute much to the child's optical rehabilitation.

The Eye Specialist and Total Rehabilitation

The eye specialist is in a key position to encourage therapy beyond medical diagnosis. The attitude toward low vision and blindness that he imparts to his patient can have an emotional impact, and effect the patient's acceptance of his eye condition.

For this reason it is to the eye specialist's advantage to be advised of community resources such as rehabilitation centers, school programs, and vocational training centers.

Initiating rehabilitation programs for the blind has seemed to be easier than initiating programs for the low vision person. In most daily situations the low vision person may be able to function visually with comfort, but he may also lose the ability to manage visually many times during the day. His rehabilitation should be at the level of his impairment, and he should be encouraged to make full use of his remaining vision. He can be helped to identify the areas where aids are needed. The eye specialist can be the key person in helping the low vision person accept the fact that he will be more comfortable using aids.

Educational and Psychological Evaluation

Since many of the psychological and educational evaluation instruments used in the schools are fundamentally the same for low vision children as for the sighted, consideration here will be limited to some of the most specific aspects of objective evaluation. Content or goals which are characteristic for a given test or a given group of sighted persons should remain unchanged in forms adapted for low vision persons. In setting up an evaluation session, however, one should plan, when necessary, for such adaptations as appropriate type size and physical format of material, possible changes in surroundings in the place where the test is given, adequate space for reading and writing when test material is large, the possible use of taped or recorded material for reading or responding to the items of the test, and, now and then, the use of the typewriter in connection with certain content.

Manuals for most tests mention the importance of rapport, climate in the testing situation, and other factors which may affect the presentation and understanding of the directions. Low vision children will need even more careful consideration in these areas. Professional people not accustomed to administering tests for low vision children may feel during their first experiences that they need more orientation. Educators who regularly observe and work with the children can provide assistance in these important areas. If time limits are changed or if more time is necessary in the orientation to the material, it is wise to record this information for the benefit of those who wish to know more about the functioning of the children. Such changes affect the results when compared with the norms established on the original sampling. Experience of educators has suggested that low vision children are anxious to achieve using the same materials presented to their sighted classmates. Where it is at all possible for the low vision child to participate at about the same time that his classmates are receiving objective tests, he should be permitted to do so. If children are ever excused from such tests, there should be excellent reasons which are understood both by the child and the administration of the school, for the gains through such instruments are often as valuable to the low vision child as to the other children in school.

When tests have been developed with a particular group of low vision people and norms have been established, for example, with other types of handicapped children or with a population of children in given grade levels of "normal" children, the information should be known by the teacher. Rarely have tests been standardized with a clearly understood sampling of visually impaired children. Usually when this has been attempted, the definition of the sampling has either been much too vague or it has been confused by the broad definition of blindness which includes both low vision and blind children.

As many low vision children with additional handicaps are enrolling in the schools, teachers are becoming more interested in tests which have been developed for those with neurological impairments or other related problems. I.T.P.A., the Frostig materials, as well as some of the scales developed for retarded children, serve as examples.

Reports from clinical psychologists and psychiatrists are of extreme value if the interpretation can be shared with the teacher. Where treatment of a therapeutic nature is carried on, the teacher can be of great value in continued consultation with the clinician.

Tests for low vision children should not be so clumsy and awkward to handle that they measure physical functioning and management of materials rather than the factors which the tests are designed to measure. Often the mere handling of some of the tests as the child uses his limited vision can be a task in itself which is not encountered by the child with normal vision. All those responsible for administering either individual or group tests should be aware of these problems and provide whatever support the situation may require without influencing the results or excusing the child when situations seem a bit difficult.

The use of all instruments of evaluation are helpful only when they are seen in relationship to the visual functioning of the child and the nature of aids required for his success in the test. These tests when given should be used as a part of a total record, but should in no way prejudice the teacher toward the educational goals for the child. The continued observation of the teacher and the interpretation furnished by all who provide objective types of evaluation should accompany the child as he moves through his school years. The evaluation for the purpose of planning should be both positive and realistic.

Members of Committee I

Irene Hawkinson -- Chairman
Elaine Bruce
Anne Busby
June Cash
Muriel Howard
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Phyllis Ricketts
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EDUCATIONAL PLANNING AND SERVICES

Programs for visually impaired children and youth, both those in specialized schools and local school districts, are dealt with extensively in leading education publications. These sources provide current information regarding the varied types of programs that are now in operation.

All of these programs offer a unique opportunity to serve not only the pupils with low vision, but also those with multiple impairments. It is fortunate that there are varied types of programs to meet the individual and changing needs of each child.

Communities have a responsibility for certain services during the preschool years. They also have an obligation for continued rehabilitation after school which can lead to a functional life as an adult. The school program does not stand apart but rather is an integral part of the growth process for each low vision child.

Contributions from Poverty Programs

Are there relationships to be found between the effects of cultural deprivation explored in current poverty programs and the effects of deprivation caused by loss of visual ability which restricts acquisition of knowledge or restricts movement in the environment? Or, is the restrictive nature accompanying lack of visual acuity or ability sufficiently different to make this comparison misleading? Are such techniques as the use of rewards, operant conditioning and task analysis applicable to many of the children with low vision? Is it possible that the physical activities involved in these programs might also be relevant to the needs of children who have low vision?

Teachers of low vision children can certainly adapt many of their experiences and procedures and at the same time evaluate results in such a way that some of the questions may become answers. Ideas from these projects may provide rich areas for further research.

Instructional Media and the Low Vision Child

Recent developments in recording technology may have implications for educators of students who are visually impaired. Among the more promising of these recent developments are the experiments with compressed or rapid speech. Compressed speech has made it possible for the listener to "read" at a more rapid rate than has been possible in the past with recorded materials.

Problems exist in many areas, some of which will have to await further research with the equipment and in the use of it by low vision persons. As these problems are researched there will be accompanying problems probably worthy of a research and demonstration type project to deal with receiving and processing requests, pricing the various types of service, and handling them as quickly as possible to meet the immediate needs of the people who desire them. There are also the problems of individual difference among people with low vision. Equipment capable of varied speeds provided at a reasonable cost is still an ideal, but work being done at present and increasingly high interest will surely provide answers in the not too distant future.

There is very little information relative to the use of compressed speech by low vision students. No doubt as more equipment and services are available more efforts will be made to describe the most effective procedures needed to integrate this manner of reading into the total program. Investigation of factors of age, grade level, motivation, and the relationship of type size to ease of reading should benefit all low vision children.

Other promising developments in the technology of instructional media are programmed instruction, video recordings, single concept films, speed reading projection devices, and language laboratory equipment and techniques. The immediacy and clarity of teaching presentations might be further enhanced by the use of the small television screen in color as well as black and white.

Of great value to teachers of low vision children has been the establishment of regional educational material centers for the development of materials and curriculum aids having specialized use. Certain of these centers have been set up specifically for those involved in the education of the visually impaired. Teachers need to cooperate, support, and study this new service made possible by the U. S. Office of Education.

The Role of the Teacher of the Low Vision Child

The role of the teacher of low vision children is a varied one. Her work with adults is primarily one of interpretation and she might be called a "finder of appropriate materials and services necessary due to the visual loss." The adults may be those regular teachers, administrators, and other professional people directly functioning in the school system, or they may be professional people outside the school where important communication is vital to the total functioning of the low vision child. Such persons as the eye specialist, representatives from social agencies, rehabilitation departments or volunteers may become very important in providing answers and requests for further service. Whether or not the teacher is the person who communicates directly with one or more of these people depends upon the administrative practice in the school system. Regardless of the practice, however, it is important that the teacher have access to all helpful information. Her role is largely that of a teacher, but she must have ample time for those non-teaching activities which facilitate the learning and visual functioning of the child with low vision.

Dr. Margaret Birkholz concurred with this philosophy. She also stated that the resource or itinerant teachers need time in their schedules to observe in the regular classrooms, to participate in conferences affecting the child, to work with those who assist in preparation of materials, and to advise in specialized administrative problems.

Miss Abel reinforced this philosophy and pointed out that she sees the role of the teacher in this area as a resource person to the low vision children, and to the classroom teachers, administrators, counselors, school nurse, parents and the community. The resource teacher is a support to all of these as she helps them secure the best possible educational services for the visually impaired. In accomplishing this goal the teacher of low vision children needs to be an active part of the team of the school. She will often need to act as a counselor in a one to one relationship and will try to keep the channels of communication open between the child and others who will work with him.

The teacher of low vision children needs to know how to find the educational implications of information found on eye report forms and must be prepared to seek further information through the school nurse if there are questions. Her relationship with the child develops from knowledge of his visual problems and his visual ability as reflected through his performance in school. Her interpretation is important in her conferences with regular teachers, nurses, and even on occasion she can provide evidence of visual functioning for the parents and the eye specialist. This information also helps her lead the child toward the development of the full potential of his residual vision. This is a type of observation and actual teaching that results from what Dr. Barraga referred to as "educated observation."

Finally, the teacher of low vision children has a role which is constantly changing. As new knowledge is available her interest in understanding the child and serving the child through substantiated or suggested research must grow. The changing population of children with low vision indicates greater changes in planning which not only affect teaching but administration. As children with much less vision enter the schools there are greater additional impairments to consider. Somehow the frustration of the past relative to children with multiple impairments must be seen in a new light. Can the problems be seen today not so much as a serious, unsolved problem in education, but more as a huge challenge worthy of study and action?

The Concept of a Visual Profile

If teachers of children with low vision are to be helpful in teaching and studying the child, they must have access to information which has meaning for them. This type of information may be recorded by a number of people who are able to observe the child and to assess his progress. This concept has been enriched for this group as it was fortunate in having Miss Gruber as a lecturer. She had just come from an Institute held at Portland State College where considerable attention had been devoted to eye report forms which were thought of as "visual profiles." There is no attempt in this report to suggest specifics of the final form developed there, but rather to reflect some of their thinking and to give support to their efforts.

The need to develop a profile to describe and reflect optical ability and visual functioning has long been recognized. Most work has been done only on the purely medical report form. As mentioned in the first section, even this work has been limited because of confused and narrow definitions.

The participants at Portland worked hard to devise a form which was positive, contained non-technical and hence more practical information and thereby was more easily understood by teachers and parents. It also would help low vision children move toward greater understanding of their vision and how it works best for them. The individual pupil, rather than an instrument, provides the information for the profile. Ideally, this report should begin with pre-school counseling by a public health nurse. It should not be limited to specific visual impairment. The form should include considerations which may be environmental, psychological, and physiological.

The discussion of the visual profile was supported in further discussions by Birkholz, Barraga, and the staff conducting the San Francisco State College Institute as they saw the need for research using the profile with a large sampling of children. Checking the profile in each case against the functioning in the regular classroom, the playground, and at home could further refine the instrument and help all concerned observe more objectively. The dividend for the child is his insight concerning his own vision. Profiles could be related to the areas of the curriculum which have a bearing on the way the child functions visually. These areas include such subjects as reading, mathematics, and various types of objective test assignments contrasted with laboratory subjects in physical education, industrial arts, and varieties of activities in the fine arts.

If such profiles are to be valuable to the child and those who work with him at school and at home, they should be kept current. They should follow the child when he moves to new teachers, and, as in the case of many children, to new schools. The profiles should become an important part of the total cumulative record, and with the availability of photocopy machines, there should be no problem transferring records to new teachers and administrators. When the professional team is discussing the problems or the progress of a child, this kind of information recorded on the profile can be of great value.

Such profiles, if well developed and used, should not become just another set of forms. They should stimulate teachers to become sharper and more sophisticated in their observation. If shared with appropriate professional people and used only in behalf of the child, these profiles could largely satisfy the long expressed need for greater communication between eye specialists and educators. Perhaps both could experience a more equal share in the total responsibility for assessing visual ability and for using this information in educational planning. As records change, the ongoing communication could contribute to constructive changes for the greatest value to the child.

Orientation and Mobility Programs for Low Vision Persons

Orientation and mobility training specifically for low vision persons has not had much direct study. Consequently, few plans have been developed to bring them special programs. Originally, interest was focused on totally blind adults, most of whom were veterans, and agencies gave them priority so that little time was left for others.

The low vision person, due to the complicated characteristics of his residual vision, presents the mobility instructor with a different kind of problem. This is primarily because he needs to learn to use his residual vision effectively for mobility. McDonald raises the question, "Is this residual vision an asset or a liability for the client?"[10] Does his vision interfere with his mobility? Even if it does, he must learn to use as much of his visual ability as possible, and then rely on his other senses to use clues from his environment for his safety and ease in movement.

Orientation and mobility instructors must spend more effort discovering the most effective mobility techniques to make use of the individual's residual vision. In certain situations and with certain tasks sensory development can be aided with the use of occluders. When taught well, the low vision person can acquire a combination of skills which will allow him to operate effectively regardless of the lighting conditions that he encounters. The mobility instruction should take place during full daylight, dusk, and in the darkness experienced in evening conditions.

Veterans administration hospitals have included low vision aids among services for veterans with severely limited vision under the assumption that remaining vision may be useful in orientation and mobility training. Harold Richterman agrees with McDonald that low vision aids should be a part of mobility training for low vision people.[11] There is a definite need for more specialized mobility training for the partially seeing person with emphasis on sensory training and the use of low vision aids for mobility purposes.

The establishment of programs specifically planned for those with low vision will certainly draw on the competency of all types of eye specialists and others who record information on some type of visual profile. The continued efforts of teachers of low vision children, working closely with counselors and consulting the ongoing information from eye specialists, should contribute much to this type of program.

Important psychological considerations are encountered by the mobility instructor as he relates to the low vision person. He can notice important changes in attitudes which may reflect changes in feelings of adequacy or possible fears at times when the student may feel insecure and unsafe. The instructor provides support, while at the same time, he looks at problems in relation to the visual functioning of the person.

Low Vision Aids Centers Available to Schools

All low vision children should have the benefits of optical rehabilitation service that includes the aid available from the great variety of optical devices. Relatively few low vision aids centers provide service based on follow-up training as well as sound recommendation and good observation. There is a need for more conveniently located centers so that greater communication can take place between educators and eye specialists about the use of recommended aids. This communication should involve the school, the parents, and the center.

If more answers are to come for the small number of children who can profit from the use of aids other than their lenses, certainly more qualified eye specialists and educators are needed who can carry out the work in this area. They should pay special attention to the questions which parents raise. Whether a child receives his aids from the office where his eye physician does the prescribing or whether he receives them from a center, written information should be available to the school either through the parent or from the source of the recommendation with the permission of the parent. Much more needs to be learned from actual observation of children with different eye conditions and visual efficiency who work at all levels in the school. Only by the close working relationship suggested can this be realized.

Identifying those children who would profit from low vision aids and permitting them to explore with varied type sizes and styles under competent supervision becomes a project which has been carried out in some localities, particularly in hospital settings, in agencies for the blind, and now and then in large cities where there has been a demonstration project. No doubt the use of funds which are now available through the states and the federal government should justify similar but more extensive projects. The projects could include training of those who cooperate in them as teachers and eye specialists. Much useful information could be gained through research and demonstration projects with a multi-disciplinary approach.

If research is to be effective and participated in widely, there must be a national effort which provides information concerning both standards for and locations of low vision aids centers. The National Society for the Prevention of Blindness, the U.S. Office of Education, and the American Association of Instructors of the Blind are professional groups whose cooperation can add to the wealth of information required for joint and effective action.

Some Psychological Considerations Related to Teaching and Learning

Teachers of low vision children, as most teachers today, are concerned with the study and activity relative to perception, cognitive processes, and teaching strategies. Certain of the contributions from these areas seem to hold promise. Others provide challenges. Considering the large population of low vision children with additional impairments enrolled in school today, teachers of the visually impaired must examine work carried on by other teachers.

The brief discussion here represents the readings by the participants and the influence of those who spoke during the Institute. It is in no way intended to be all-inclusive. Perhaps the mention of references should stimulate teachers of low vision children to pursue further study.

Of particular interest to teachers is a recent study conducted by Birch, Tisdall, Peabody and Sterrett, which points out that one of the most significant problems in the education of visually impaired students is underachievement.[12] Their research indicates that a "typical" visually impaired student in the sixth grade is two and one-half years retarded educationally. His poorest achievement tends to be in reading and spelling.

In the area of reading it has been observed that some children with comparatively mild impairments tend to read more poorly than other children with severe visual impairments. Bateman theorizes that perhaps our teaching goals have been too low with respect to developing adequate reading skills, and that perhaps we may be dealing with a child who possesses a learning disability or problems in perception.

McCarthy refers to this type of student as one with ". . . normal or potentially normal intelligence who has learning disabilities of a perceptional, conceptual or coordinate nature. . . ."[13]

McCarthy describes five problem areas dealing with communication and perception disorders. These areas include visual motor function, auditory vocal function, decoding disabilities, and problems involving the association of ideas.

In the Teacher's Guide that accompanies the Frostig Program for the Development of Visual Perception, perception is related to education.

> If a child lags in perceptual development, which normally occurs between 3½ and 7½ years, he has difficulty in recognizing objects and their relationships to each other in space. His world appears unstable, clumsy, and unpredictable. The distortion with which he perceives visual symbols will make academic learning difficult if not impossible, no matter how intelligent he is.
>
> . . . The ability to differentiate letters that have the same form, but different positions (such as b-d) and the ability to recognize the sequence of letters in a word, and words in a sentence, depends upon the normal development of perception of position in space and of spatial relationships . . .[14]

There are many approaches now being explored. Each approach suggests answers for the teachers of poor readers. One approach might present a program of sequential learning in which each goal is broken down into its component tasks. This teaching concept has been explored by Gagné.[15]

An example of this approach to teaching reading has been discussed by Bateman. She assumes that reading is basically two different functions. The first is the perception of visual symbols and conversion into speech. The second function is comprehension or attaching meaning to the sounds produced in the first function.

Bateman contends that in beginning reading, the child has so many tasks to master that he need not be bothered with comprehension (the second function of reading) until he is well along toward mastery of the mechanics of reading (the first function.) Reading should be

> taught as a rote, conditioned, mechanical process of converting letters to sounds and . . . the comprehension of many symbols (including sounds combined into words) should be taught as a separate process.[16]

Perceptual disabilities among children who are visually impaired and current methods for remediation and teaching imply that services for visually impaired students should include the utilization of supplementary services available in our schools; for example, remedial reading, perceptual training, improved teaching and learning strategies, and techniques and services from educationally handicapped programs.

The teacher may pursue specific types of assessment and instruction as suggested by Barraga or consider theories and research from others who have not worked with visually impaired children. No matter what direction she takes, it is suggested that she seek assistance from other resources in the school district and share her findings. In this way good theories may be substantiated and more action research that affects practice may take place in the schools.

Vocational Rehabilitation for Low Vision Children

Many articles dealing with the education of handicapped children have emphasized the importance of school authorities and rehabilitation counselors working together. It seems redundant to discuss this topic here. Some problems, however, arise from the type of rehabilitation services available throughout the states. They are most often provided separately by counselors in divisions for the blind which use a broad definition of blindness which includes many low vision persons.

Vocational Rehabilitation Administration as it functions nationally and through the states has a keen interest in optical rehabilitation and also in the total rehabilitation of the impaired person. The concept of impairment as well as the visual codes developed from their projects have great implications for the assessment of the capabilities of those who have low vision and hence for their ultimate functioning as adults.

With increased legislation, services of varied types are possible and should be considered. Educators have a responsibility to participate in these services to a greater degree than was previously possible. Ways must be found to make use of all types of information from the time the child enters school to the time he is able to seek employment. Schools have an obligation to provide meaningful information concerning vision, visual functioning, and other related but vital information to other responsible agencies.

As rehabilitation specialists participate at an early period in working with children in school, it is hoped that they may, like the previously mentioned eye specialists and educators, communicate vigorously with the school personnel in order that what is already known about the child and what is to be known will work in the child's best interest. When schools have been able to pursue a positive optical rehabilitation program, mobility instruction and other services geared to those who use their visual ability it is hoped that the skills gained will be taken into account by rehabilitation specialists. There will thus be a continued working relationship with a child who functions more like a low vision person than like one who is blind.

Major problems can exist for the person who asks for service at that critical time in life when he is anxious to move on to the world of work. The rehabilitation specialist, when called upon, will be constructive in building on the available written reports and other sources of information about his client. It is hoped that as they work together that they will fill in a structure of planning based on a full understanding of all of the potential that the low vision person possesses.

This discussion has been based upon the philosophy that the school program is but a part of the life of a total person. It begins with infancy and early childhood and continues through whatever fortunes exist for the young adult and the mature citizen. He has a right, if he is able to do so, to participate at whatever level possible in a society in which he will continue to need understanding and appreciation.

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EXISTING AND NEEDED RESEARCH

Consideration of needed research will be given under the broad classifications of optical rehabilitation, social and emotional adjustment and technology. Research in the fields of ophthalmology, psychology, and sociology will ultimately help teachers and other service personnel work with low vision children. However, since educators are not directly concerned with these disciplines, all of the implications of their findings are not considered in this report. The goals in this discussion will be to consider the implications of existing and needed research which directly affects teaching, programs, and the educational needs of low vision children.

Existing Research

Existing research concerning the low vision child is sparse. Confusion in the existing studies often occurs because the experimentors frequently fail to make a distinction between the partially seeing and the blind population utilized in their studies. Current thinking indicates significant differences in the functioning of the blind and the partially seeing. Therefore, the results of many studies seem to be of questionable value when generalized to the low vision population.

In view of these difficulties, replications utilizing more definitive samplings of the low vision population will prove to be of greater value. As Lowenfeld states, ". . . a more functional differentiation within the heterogeneous group of children with visual impairments appears to be a prerequisite for any more successful research effort."[17]

The purpose of this report is not to review all existing research concerning low vision children. For more comprehensive recent reviews, the reader is urged to consult Lowenfeld, Ashcroft and Harley,[18] and Nolan.[19]

Considerable research has dealt with the evaluation of large print, availability of low vision aids, compressed and rapid speech, and survey studies of school populations. Pintner has indicated that most research done has been concentrated on the organizational and technical aspects of education.[20] Little has been available that directly contributes to the understanding of the low vision child's problems and abilities. Meyerson has provided information concerning the real problems for the researcher who desires an adequate population of all types of visually impaired persons. His discussions refer to sociological and psychological studies which are often more relevant to education.[21]

Recent studies by Barraga,[22] Bateman,[23] Birch,[24] Jones,[25] Peabody[26] and Nolan,[27] however, have contributed to knowledge concerning the abilities of low vision children as they function in the educational program. Although these studies have been of help to educators, there is an urgent need for further study.

Optical Rehabilitation

Most educators of the visually impaired are aware of the implications of the shift in philosophy from sight saving to sight utilization. Also, the concept of total rehabilitation in relation to optical rehabilitation broadens the goals for understanding and providing service. This greater breadth indicates a variety of types of studies, as well as unique research designs. Any attempt to approach an understanding of the low vision person as a totality will involve several related disciplines and pose considerable challenges for those who pursue serious studies.

Barraga suggested that much could be learned about visual behavior if studies were conducted in which variables such as intelligence, self-concept, and personality characteristics were held constant. She further suggested that research be conducted to explore the possibility that an inverse relationship exists between intellectual functioning and visual acuity.

Research is needed to explore the relationship of external environment and visual functioning. Investigation could increase our understanding of the relationship of fatigue and distraction factors, the relationship of cultural background and visual perception, the effect of color perception on visual functioning, and the relationship of general levels of arousal and visual efficiency.

Hoover and Lowenfeld both said that there is a need for research to assess separate visual factors necessary for effective visual performance of daily living skills, e.g., how much vision is required to read a menu, to ride a bicycle, to drive a car, to identify street signs or bus lines. Such populations of low vision persons should be carefully described.

A child's concept of his environment is often reflected by his vocabulary or the manner in which he uses words. Although some have studied verbalism among blind children, no research has been initiated to explore vocabulary development or prevalence of verbalism among low vision children. Barraga suggested that research be conducted to investigate vocabulary development as a method of evaluating the visual functionins of low vision children.

Dr. Barraga reiterated the desirability of replicating her study to further explore her hypothesis that visual perception develops on a sequential basis.

Research in the area of low vision aids has been primarily concerned with personality characteristics related to acceptance or rejection of the aids. Studies are urgently needed to investigate the effects of low vision aids on visual stimulation, the applicability of low vision aids in mobility training, and comparable efficacy of low vision aids and a program of planned visual stimultation. The group considering research in this area were fortunate to be able to draw heavily on the comments and suggestions of the lecturers.

Social and Emotional Adjustment

The growth and development of low vision children, as in the case of all children, requires great understanding of infancy and the pre-school years. Study has been much more concerned with blind children than those having limited vision. The confusion in definition, and the concerns of the parents of the very young have contributed to ambivalence related to the degree of visual loss. Would the child be blind or would he have useful sight? This ambivalence has naturally affected the researchers who could not readily secure a definitive sampling. Research with descriptive information relative to visual ability of very low vision children is greatly needed. Such research begun early could provide the beginning of important longitudinal studies.

Valuable studies of the functioning of school age children are needed, where the controls comprise parents who experienced counseling in the pre-school years, and those who had no such service prior to enrollment in school. The complicated problems in instrumentation and sampling seem to baffle both the educator desiring more knowledge and the researcher seeking fruitful studies. Dr. Marjorie Hayes supported the group's feeling that there is great need for more clinical study of low vision children. Such studies could be greatly enhanced by the inclusion of information concerning their visual abilities and functioning.

Many of the lecturers pointed out the relationship of the teacher and others in the environment upon the total functioning and indeed the self-concept of the low vision child. The restrictions imposed by limited vision can have serious implications for the low vision child and for those who attempt to bring understanding and interpretation to him. Problems of ambivalence, both as he sees himself and as others see him, suggest many questions which are highly related to his communication with sighted persons important in his environment. More communication among professionals in the various disciplines, specifically from psychiatry, sociology, psychology, and education, could contribute much to research planning and possibly to more projects involving an interdisciplinary approach to certain of the highly complex problems relative to emotional and social adjustment.

Education

The needs in educational research are highly related to the competency of teachers with specialized qualifications and also to the problems and potentialities of the child with low vision. While research in education is broad, the needs for knowledge dealt with here will attempt to be specific to the children under consideration. Teachers gain their understanding of the child to a great extent from the colleges and universities where they study contributions from research and good practice. These programs need to be flexible enough to reflect changes in the general educational program in addition to changes relative to the low vision child. There is urgency today for more knowledge relevant to the low vision child with additional impairments. Medical and psychological research, as well as experience, points out the changing population enrolled in school today. Teacher education faces a real challenge in integrating into its curriculum new knowledge and information from related areas which should increase the teacher's effectiveness.

Curriculum research of a highly specialized nature is needed in instructional procedures and such areas as mobility training, visual assessment, and the use of technical equipment. Also there should be study of necessary adaptations of the aspects of the curriculum available to all children. Such studies should lead to an understanding of the justification for necessary change, possible deletions in materials presented, and needed equipment to make change unnecessary at times. Curriculum guides including this type of explanation would contribute to understanding by the teacher of the functioning of the low vision child.

Educators are also very interested in the progress technology has made in the past few years affecting all children and the implications this has on curriculum development. Teachers of low vision children have little knowledge from this area applicable to their planning for their students. A dramatic illustration of this deficiency is the area of programmed learning. Although this has long since passed from the theoretical state, we still have no studies to tell us how, or if, this can be effective with low vision children. Barraga's studies raise questions for further research in mode of reading for the low vision child.[28] To date such studies have been concerned with information collected largely for statistical purposes. A definitive sampling of low vision children relative to their progress and information gained from a complete visual evaluation would provide a rich source for more than one study concerned with reading characteristics and efficiency of these children.

As has been pointed out in other sections of this report there is great need for research which will determine the nature and type of mobility instruction which should be offered to low vision children. Such studies should be based upon information dealing with optical rehabilitation, theories of learning, and good educational procedures. They should reflect those visual abilities which contribute to success, as well as those which would help locate the children who might not be able to function well visually. This information would help the educator make a referral to a program in orientation and mobility designed for children who are blind.

With the increased population of infants with multiple impairments it is highly important that research centers be established which have access to representatives from all types of disciplines for the purpose of early evaluation of multiple impairments in children. Such centers should make it possible for researchers to provide more descriptive studies of characteristics in these children so vital to understanding by all concerned. Such studies should also have an impact on teacher education. It would seem that a strong teamwork approach would provide more knowledge about the relationship of certain types of impairments to the low vision child. This knowledge should be highly useful in educational planning.

Effective diagnosis available with clear recommendations for treatment can provide the parents with information relative to possible constructive changes in the home. Both support and guidance for parents can be more objective when based on this type of cooperative research.

Intelligence tests for use with low vision children universally omit a performance section. Such a test is needed in order to fill in the global concept of the child. Research, then, needs to be initiated to develop and standardize this kind of test. There is also need for more research to develop and apply all types of appropriate aptitude tests of value to understanding and planning the vocational objectives of the low vision child.

Technology

Technological research related to the education of visually impaired children may lead to the development of useful instruments and techniques not now available. As yet, most of this work has not reached the state of practical application.

Studies with audio materials are of special interest to teachers. For example, it has been shown that compressed speech can be utilized for short periods of time. There is a need for research exploring the use of compressed speech for a longer period of time. This area will not only facilitate reading for low vision persons, but will also make the materials more manageable.

Research to evaluate visual media such as film strips, overhead projectors, and video tape is needed. Improvements in degree of contrast and precise focusing should increase students' efficiency in his use of these devices. There is reason to investigate the variation and size of T.V. screens in regard to particular problems of low vision. Development of better devices would be of great help for low vision individuals.

Certain technological research in instruments that stimulate receptors on the body's surface seem to hold great promise as possible substitutes for vision when functioning in complicated environments. The eager mind dares to dream of the new knowledge coming from certain electronic developments and the space programs carried on by N.A.S.A. and by other institutions carrying government contracts.

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Appendix A

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Mr. Richard Holm, Assistant Professor, San Francisco State College

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Miss Pat Kemper, Guidance Consultant, Berkeley Unified School District, Berkeley, California

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